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TRADE-NAMES	HI-NICALON	HI-NICALON S	TYRANNO SA	SYLRAMIC	SYLRAMIC -iBN, (or SYLRAMIC -iC)
Manufacturer	Nippon Carbon	Nippon Carbon	UBE Industries	Dow Corning*	Dow Corning* +Invention
Max. Process Temp.	~1300°C	~1600°C	>1700°C	>1700°C	>1700°C
Second Phases	C/Si=1.4 + trace O	C/Si=1.05 + trace O	C/Si=1.08 + trace Al ₂ O ₃	C/Si=1.0 + trace B, Ti	Reduced B, + trace Ti
Surface Chemistry	C-rich	C-rich	SiC	B + Ti + SiC	BN (or C)
Avg. Grain Size, nm	5	<100	≥150	~100	>100
Thermal Conductivity at 20°C, W/m °C	6	18	65	46	>46
Strength (Fabric), MPa	2100	1600	1300	2200	2100
Creep Strain, 1400°C, 250 MPa, 50 hr, air	>1.0%	0.2%	>0.5%	>0.5%	0.1%
Max. Temp. For Rupture At 500 MPa, 1000 hr, air	1200°C	1150°C	1150°C	1150°C	1300°C

* SYLRAMIC fiber now being produced by COI Ceramics

Fig. 1

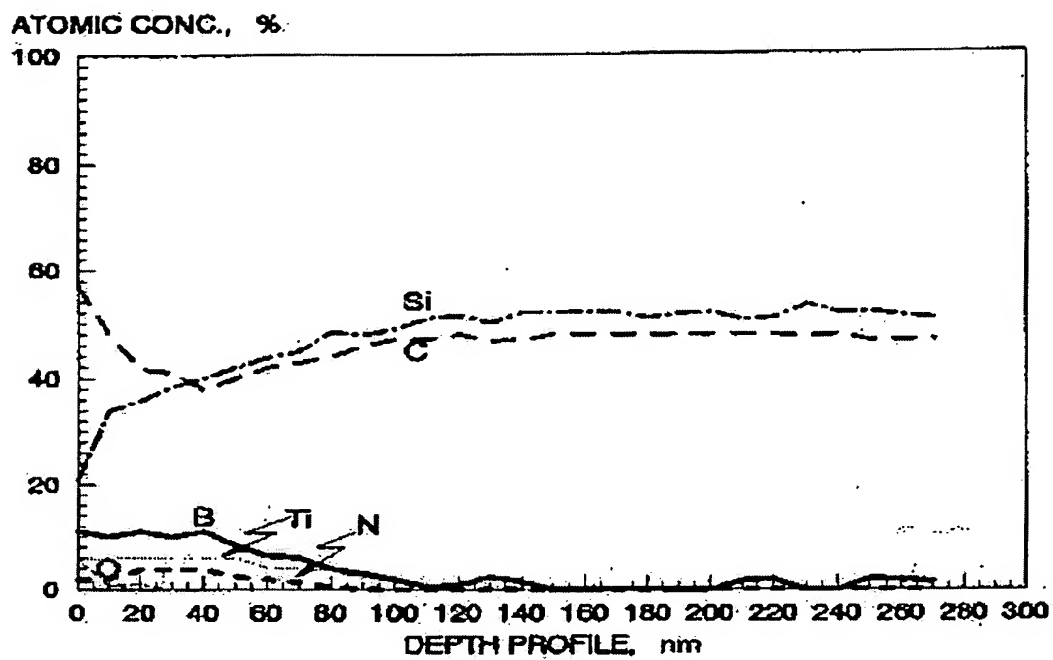


Fig. 2(a)

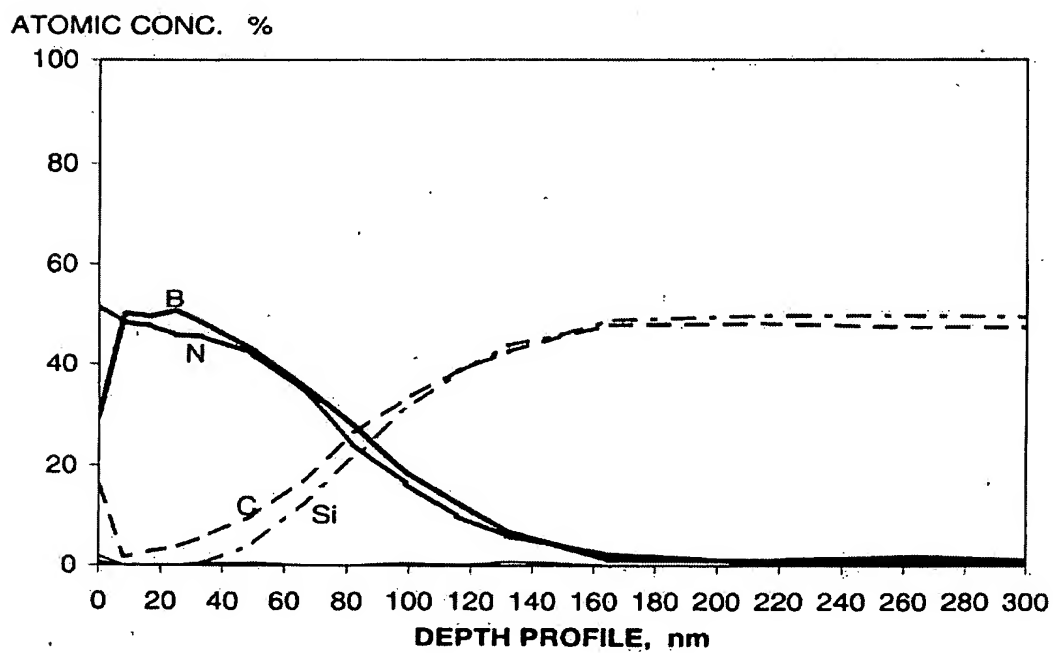


Fig. 2(b)

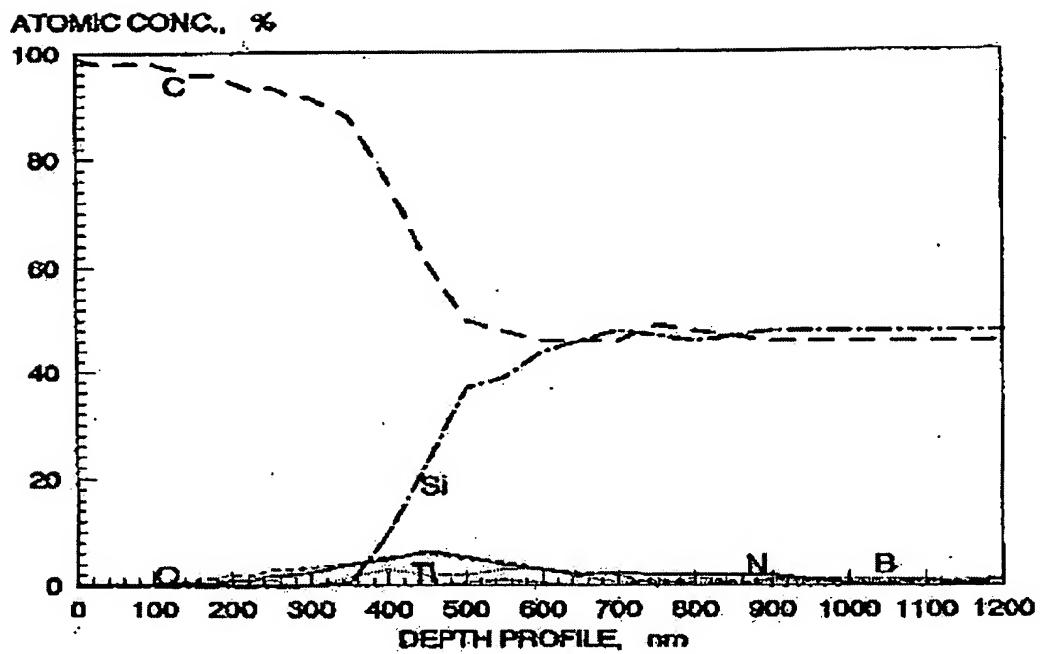


Fig. 2(c)

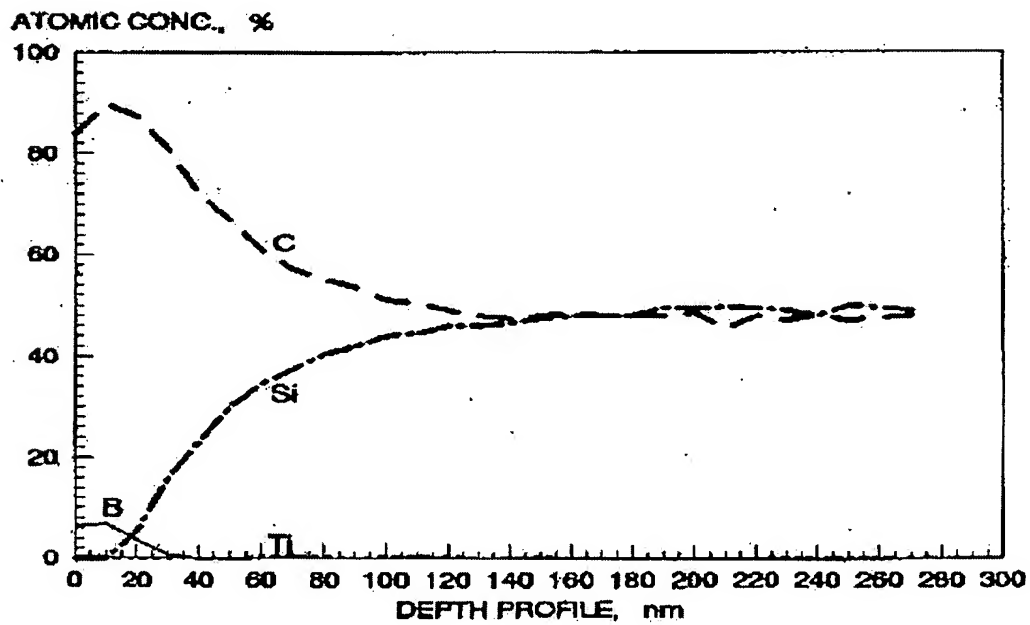


Fig. 2(d)

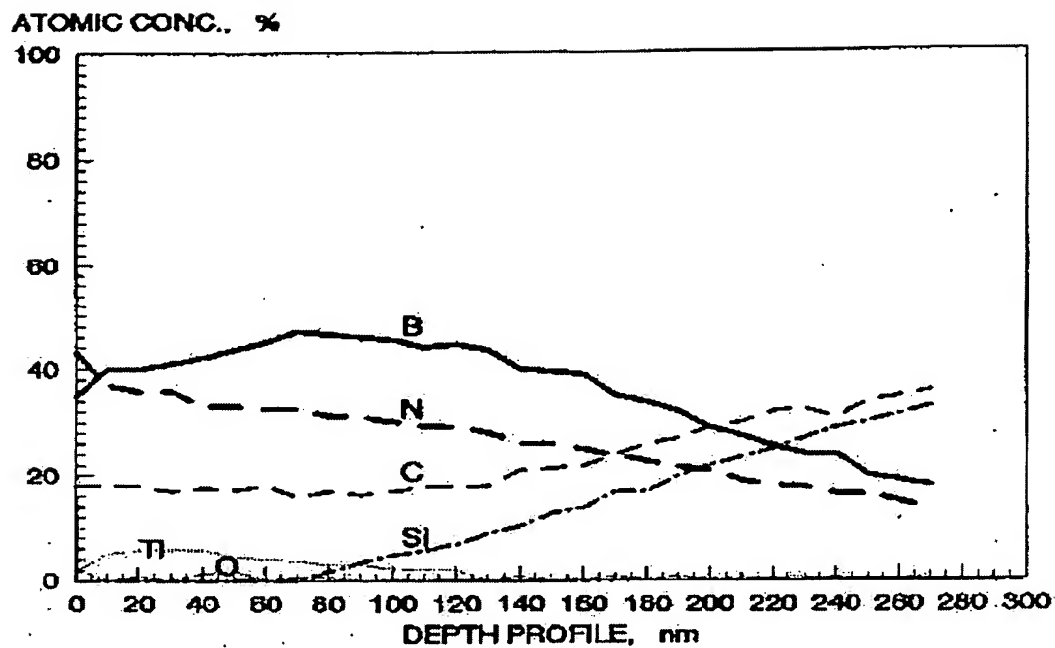


Fig. 2(e)

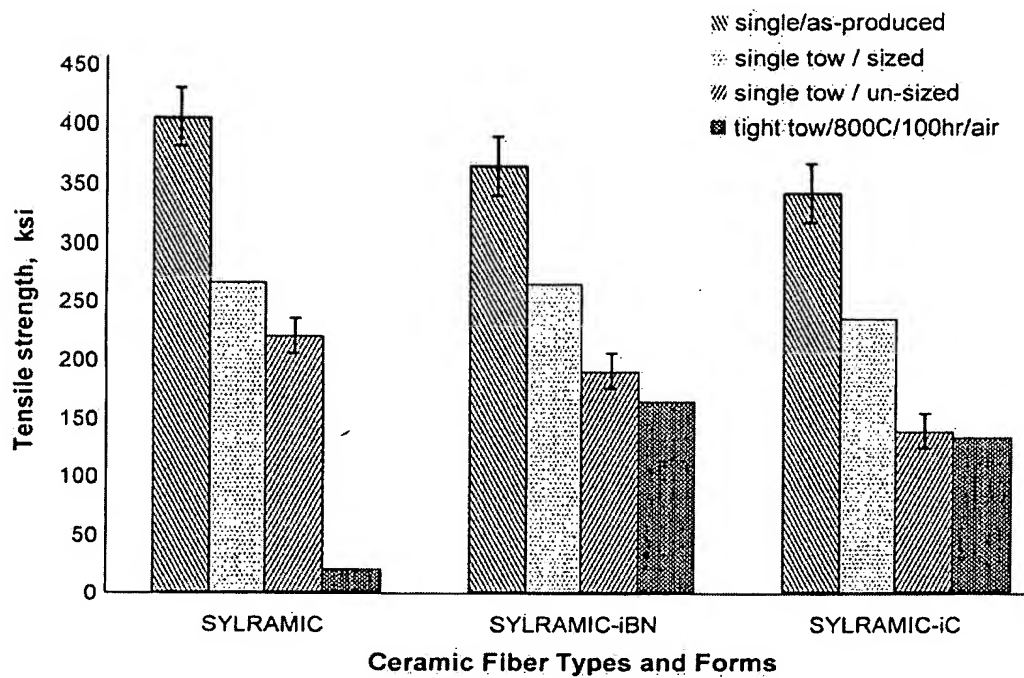


Fig. 3

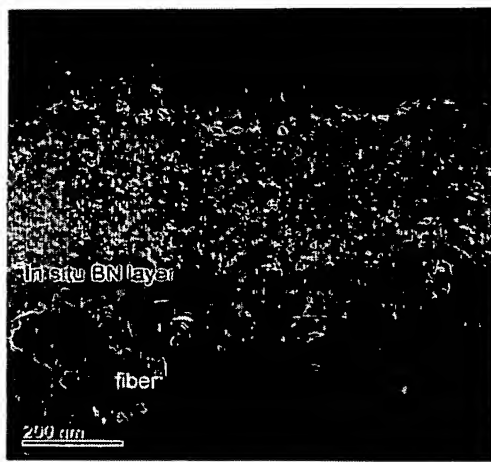


Fig. 4(a)

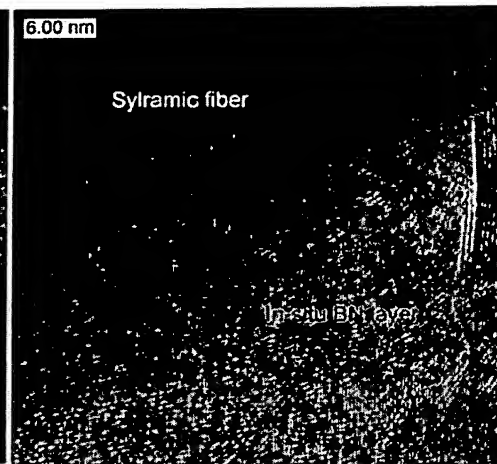


Fig. 4(b)

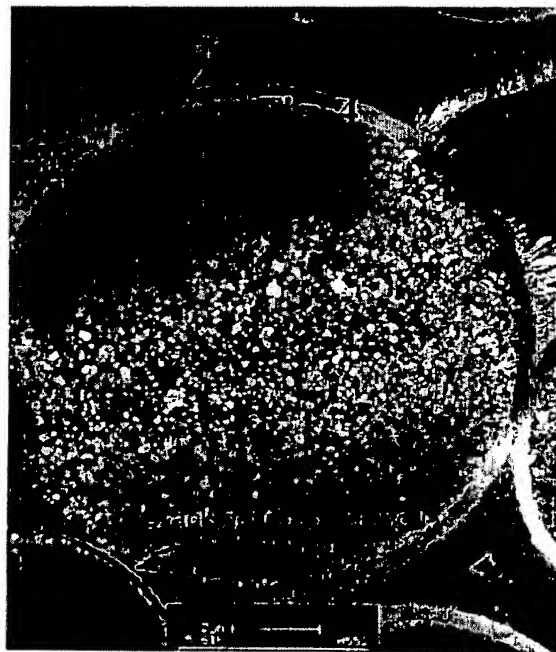


Fig. 4(c)

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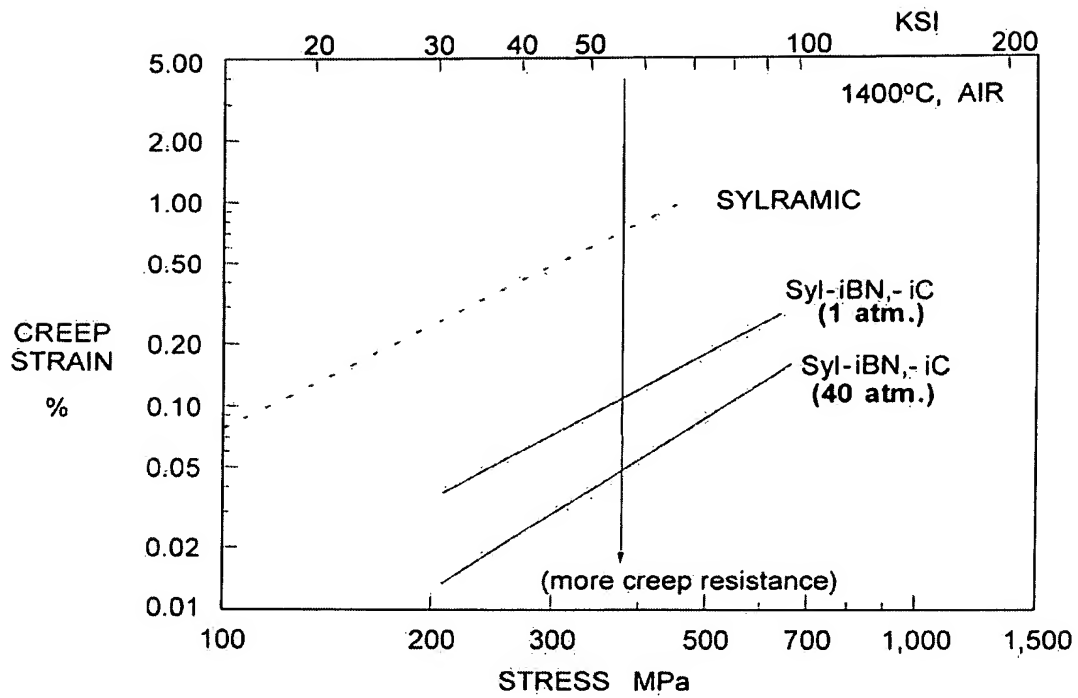


Fig. 5

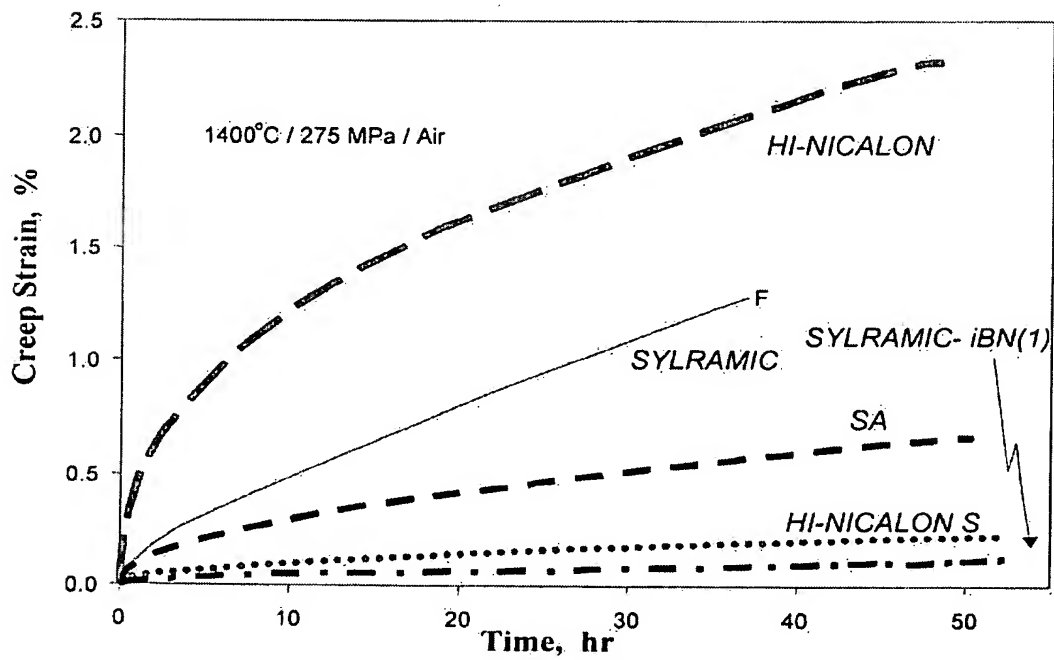


Fig. 6(a)

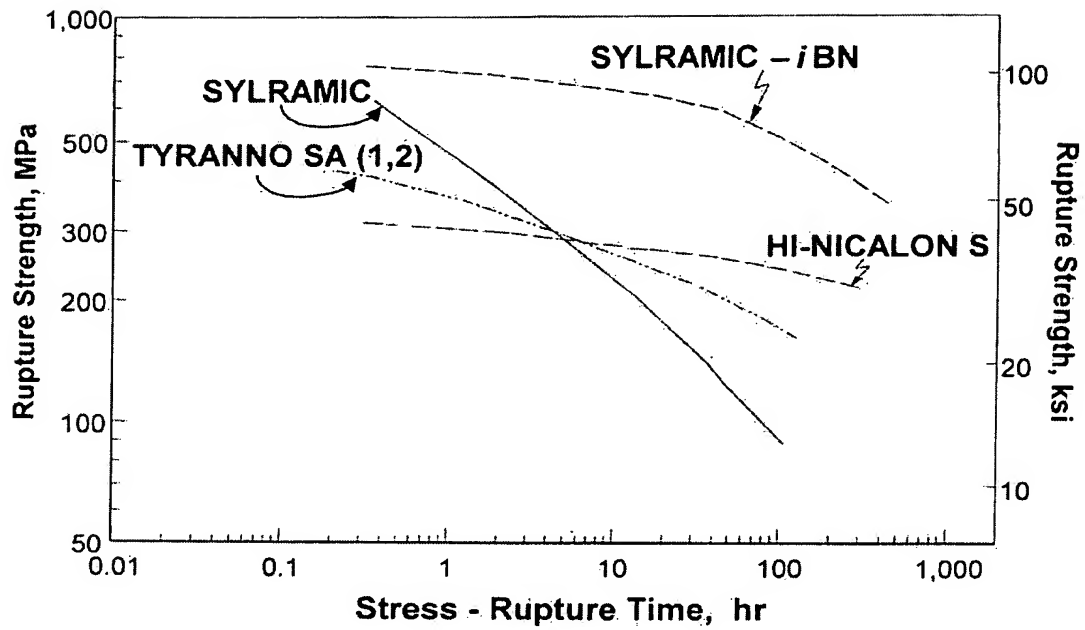


Fig. 6(b)

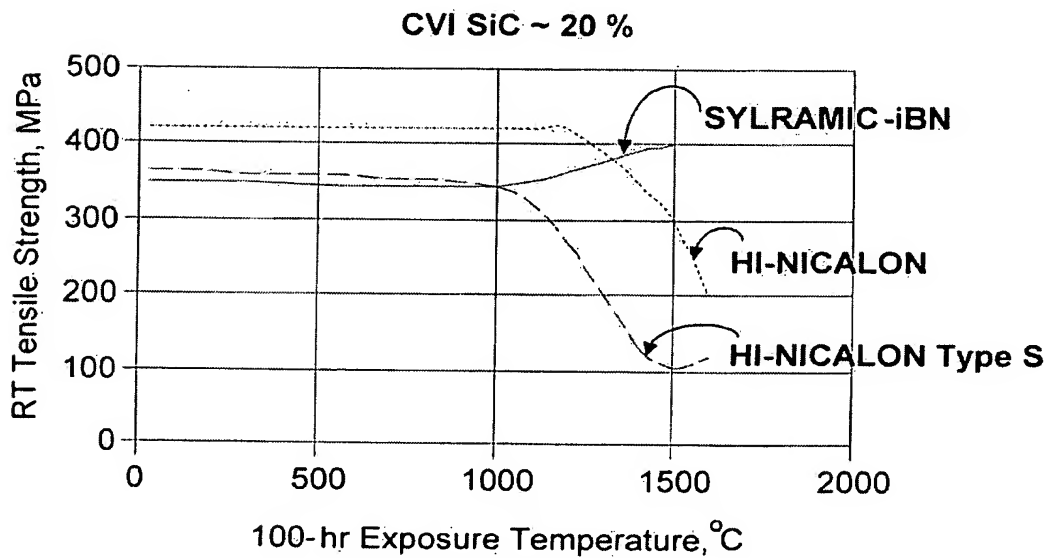
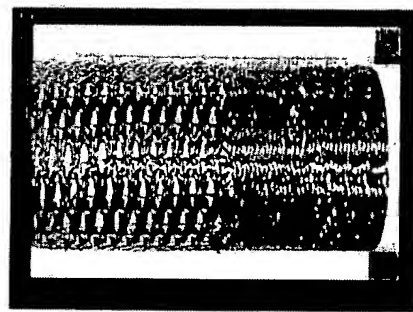


Fig. 8

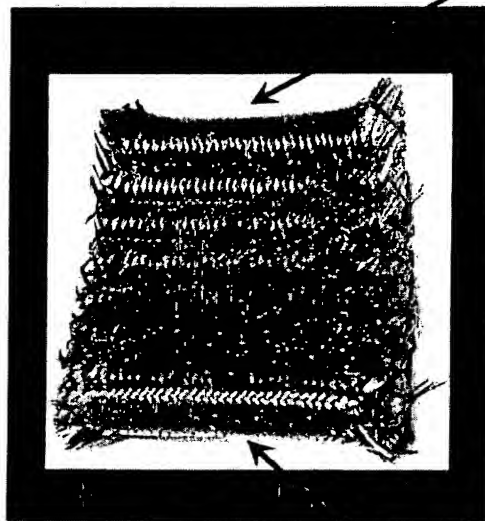


2 in. diameter
2D-braided 3-ply
SYLRAMIC tube



shape and
heat treat

SYLRAMIC-iBN
vane pre-form



Leading Edge:
R = 300 mil

Trailing Edge:
R = 70 mil

Fig. 7(a)

Fig. 7(b)

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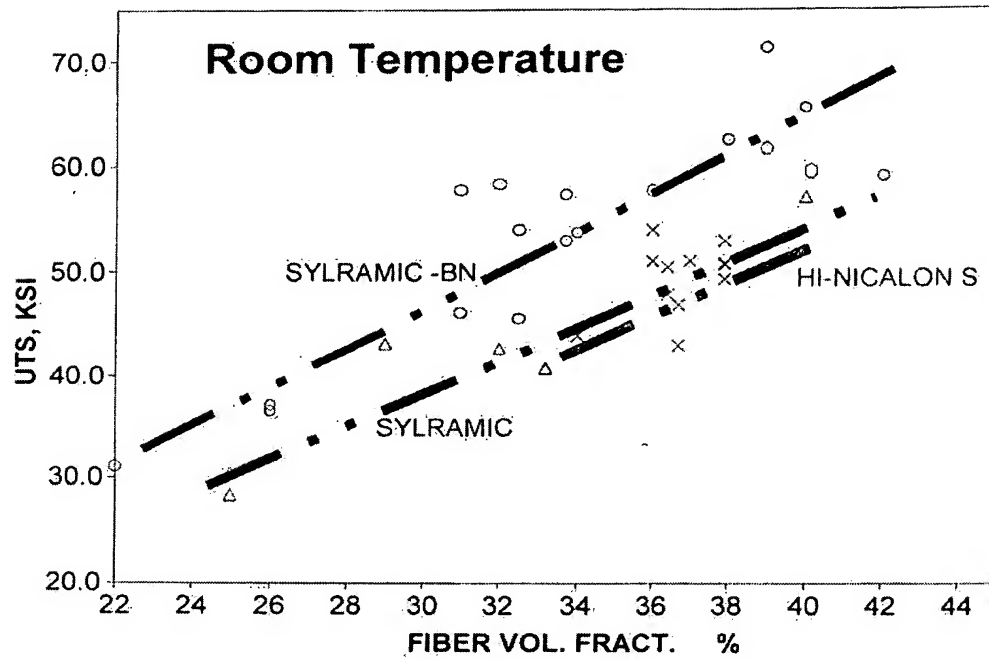


Fig. 9(a)

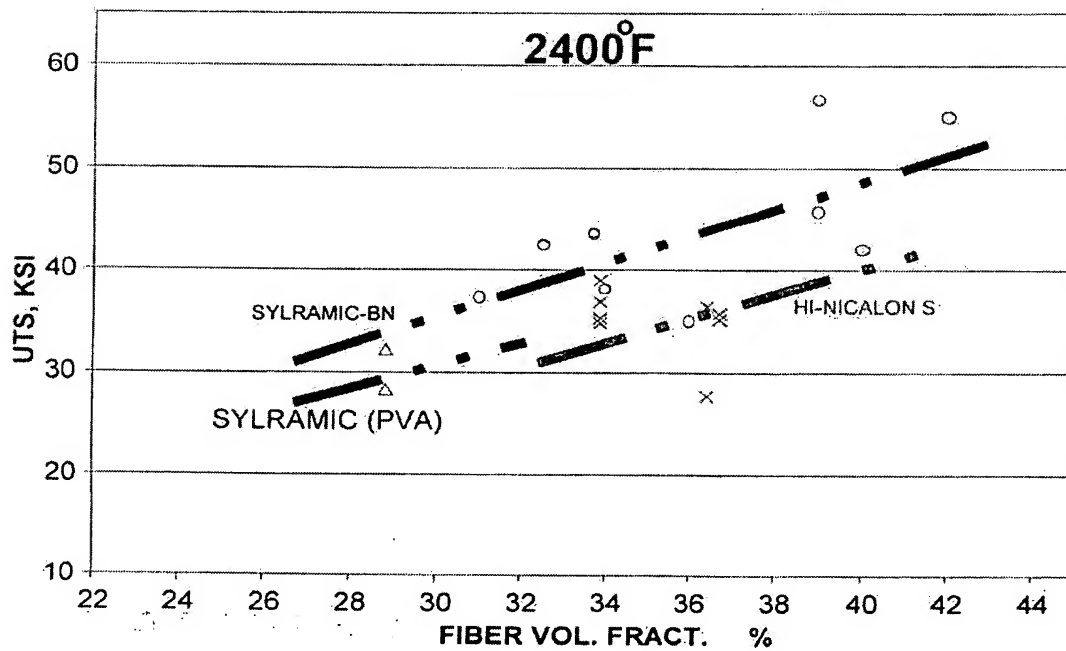


Fig. 9(b)

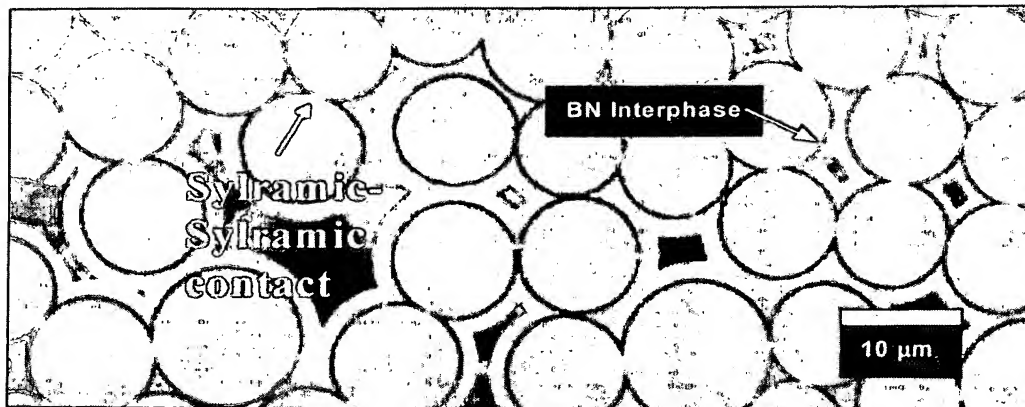


Fig. 10(a)

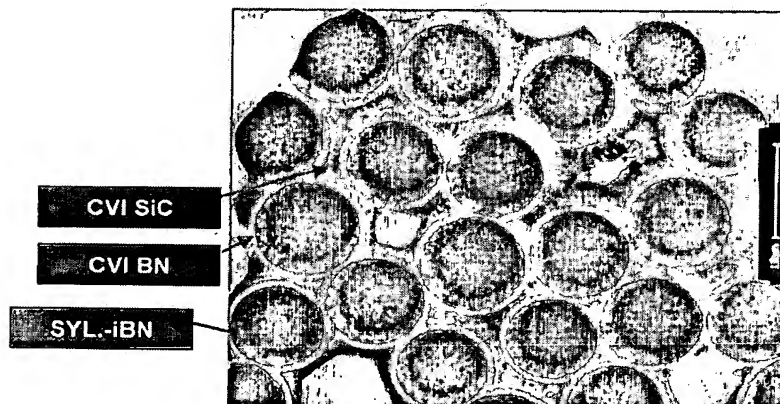


Fig. 10(b)

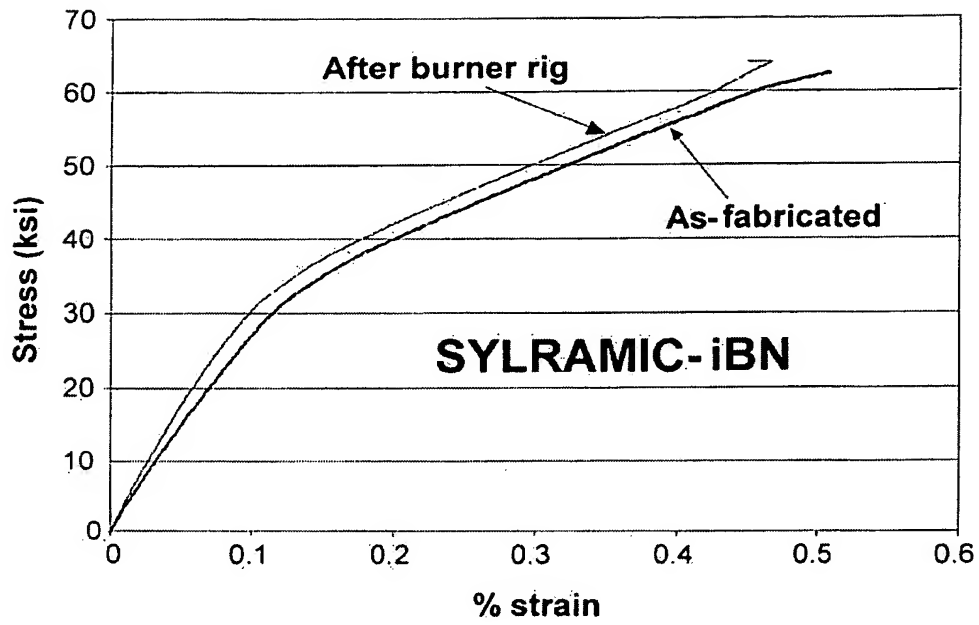


Fig. 11(a)

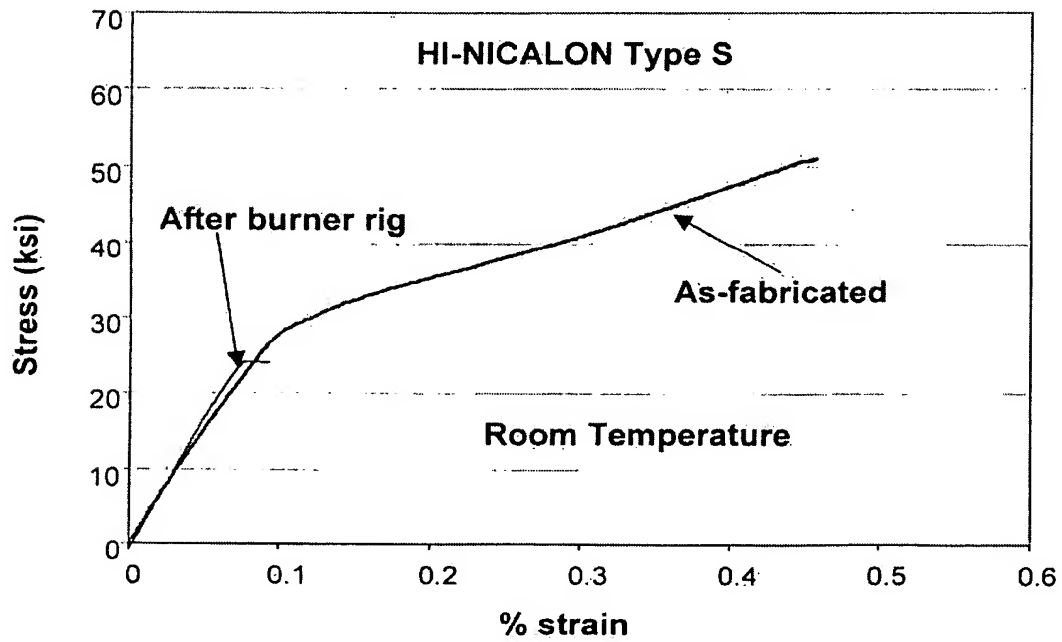
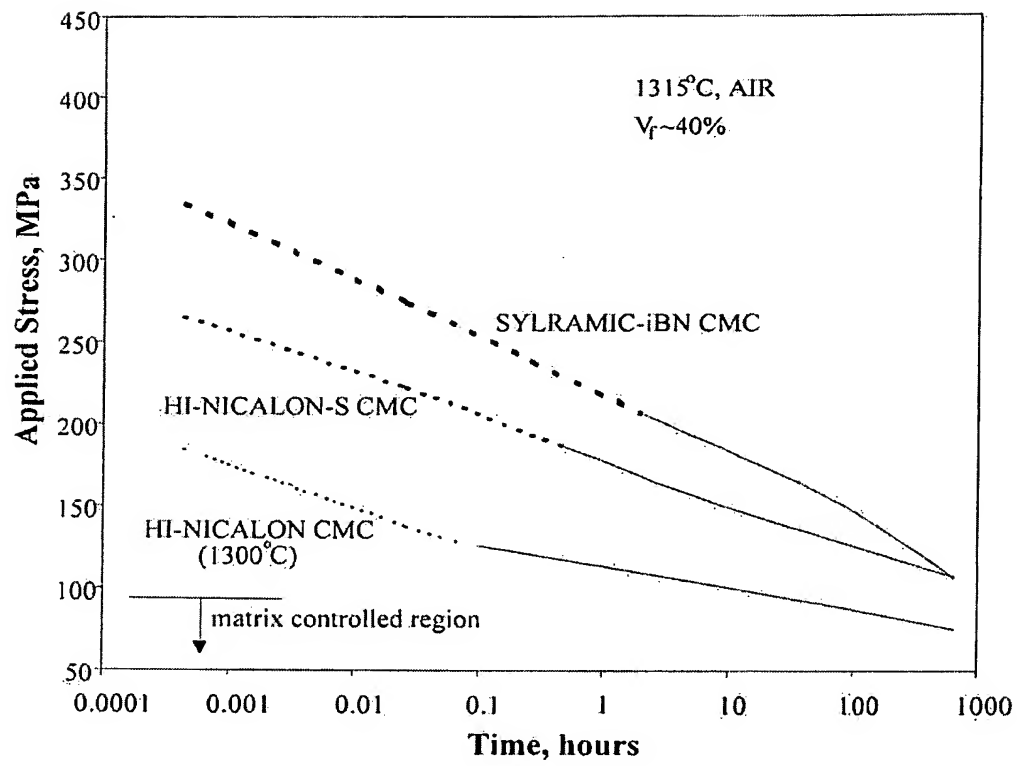


Fig. 11(b)

**Fig. 12**